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WITH SPECIAL REFERENCE TO SURVEYS
JUNE - AUGUST, 1951
RECONNAISSANCE SURVEY

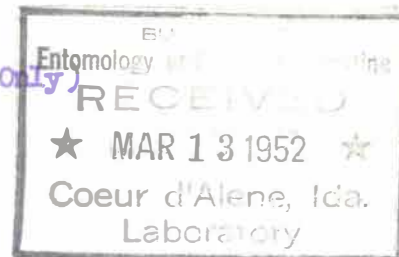
By

Daniel M. Benjamin and Norman F. Smith ^{1/}

Forest Insect Laboratory
Milwaukee, Wisconsin

March 6, 1952

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Division of Forest Insect Investigations

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Gibbs E.
Johnson...
Terrell...
Trestle...
Lenton...
Zvenden...

^{1/}

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THE JACK-PINE BUDWORM IN MICHIGAN IN 1951

WITH SPECIAL REFERENCE TO SURVEYS

The jack-pine budworm, Choristoneura sp., present in epidemic numbers in 1950 in north central Michigan and on the upper peninsula, continued in outbreak in 1951. In general, the principal outbreaks were confined again to the Au Sable, Higgins Lake, and Ogemaw State Forests and to the western one third of the Huron National Forest on the lower peninsula, and to the Rapid River Ranger District of the Hiawatha National Forest on the upper peninsula. In addition, several new infestations were detected in Michigan in 1951 where budworm populations appeared to be increasing. Most of these areas were located on the lower peninsula, the most serious on the Presque Isle and Houghton Lake State Forests. Budworm populations were also reported increasing on the Manistique Ranger District of the Hiawatha National Forest on the upper peninsula.

Surveys to determine the extent of the 1951 jack-pine budworm outbreaks and the general distribution of the insect in Michigan were conducted on State Forests by the Michigan Department of Conservation, Forestry Division, and on National Forests by the Milwaukee Forest Insect Laboratory of the United States Department of Agriculture, Bureau of Entomology and Plant Quarantine. The results of these surveys are presented here as separate sections treating conditions on state and federal forest units.

Jack-pine Budworm Situation on State Forests

The jack-pine budworm continued to occur in outbreak stage in many of the state forests of the north half of the lower peninsula. Its occurrence in the upper peninsula state forests was confined to limited areas in Delta and Schoolcraft counties which were a part of the main infestation in that area. Information on the extent and severity of the budworm outbreak in the state forests was obtained from two sources described below.

Aerial Reconnaissance

On August 1, 1951, two flights were made in a Department of Conservation plane with personnel of the Forestry Division and Bureau of Entomology and Plant Quarantine. Starting from Roscommon the first flight went east along the common boundary of the Huron National and Ogemaw State Forests to highway M-33, north across the Huron Forest to Mio, west over the Au Sable River to the Kalkaska-Crawford county line and back to Roscommon. The second flight went from Roscommon to Atlanta, and north over the jack pine areas of Montmorency County and back.

An attempt was made to classify jack pine areas within the infestation according to intensity of defoliation based on foliage color as observed from the air. Green foliage indicated light or no infestation, brownish-green (more green than brown) indicated medium infestation, and greenish-brown (more brown than green) to brown indicated heavy defoliation. Changes in degree of infestation were recorded on county maps held in the laps of three observers.

The method did not prove entirely satisfactory due to difficulty in detecting very gradual changes from one defoliation intensity to another and also because of inability to determine the exact location of the plane at all times. In spite of these handicaps there was reasonably good correlation between the information recorded independently by the observers. These observations also checked fairly closely with ground surveys.

Ground Observation Reports

Under the provisions of the Michigan Forest Pest Detection Program annual observations are made on permanently located areas for specific insects (4). Between June 20 and July 10, 135 areas were examined for the budworm in the north half of the lower peninsula and the upper peninsula. Jack-pine budworm defoliation was reported on 52 or 39 percent of the observation areas. This is an increase of 23 percent over last year (based on approximately the same number of observations) indicating also that the insect was found in new territory this year. In 1950 the following counties were listed as infested:

Alpena	Montmorency
Cheboygan	Ogemaw
Crawford	Otsego
Delta	Roscommon
Kalkaska	

In 1951 the following counties were reported infested in addition:

Clare	Oscoda
Grand Traverse	Presque Isle
Lake	Schoolcraft
Missaukee	Wexford

It is quite possible that the budworm was present in these additional counties in 1950 but was not observed. However, in 1951 defoliation was more severe and consequently reported.

Defoliation in the state forest areas was observed to be heaviest in northwest Ogemaw County, which was the case in 1950. Lightest general defoliation was reported from Grand Traverse, Lake, Missaukee and Wexford Counties. Among the positive reports 52 percent recorded defoliation of 40 percent and over, an increase of 10 percent over the previous year. Only one report indicated defoliation in excess of 80 percent.

Mortality among reproduction is becoming very apparent beneath infested jack pine overstories. On the Higgins Lake Forest white pine growing under a jack pine canopy in a 35-year old mixed plantation sustained an 80 percent mortality caused by defoliation by budworm larvae dropping from the heavily infested jack pine overstory. Red pine in an adjacent plantation of mixed red and jack was also attacked but no mortality was apparent in 1951. Relatively few mature trees have been killed but many are in a very weakened condition. Observations in October in areas classed as medium and heavy in mid-summer showed most of the trees to be in a green, apparently healthy condition.

Recommendations

In view of the very general nature of the budworm infestation direct control measures by spraying are not considered practical for the state forests involved. Spraying of plantations in restricted areas has been discussed, and it has been decided that the costs would not be justified when the effects are considered in light of the whole area needing treatment. The spraying would be probably effective for only one year and then the area may be reinfested by budworms from surrounding stands. Spraying is therefore not contemplated for state lands in 1952. A close vigil will be kept, and if it is found that budworm caused mortality in merchantable timber becomes heavy in 1952, or that secondary insects such as bark beetles begin to take their toll, spraying may have to be initiated.

Continued sales of mature jack pine timber should be promoted to eliminate concentrations of staminate flower-bearing trees. The volume of jack pine removed in the Au Sable, Higgins Lake and Ogemaw State Forests has been doubled since 1949, increasing from 4,431 to 8,586 in 1951. If market conditions continue to be favorable, the cut in 1952 should be even more.

Jack-pine Budworm Situation on the Huron National Forest

Intensive ground surveys conducted to determine the extent and seriousness of the jack-pine budworm defoliation on the Huron National Forest during 1951 followed, in general, the method developed and used during the 1950 budworm survey (1). At intervals of approximately one mile along the major transportation routes through the Huron Forest, a series of temporary roadside observation plots were examined for evidence of budworm defoliation. On each 1/10-acre plot, which was located in jack pine type 200 feet from the road right-of-way, the following information was collected:

Date
Plot Number
Plot Location
Host Attacked
Species
Origin
Average Height

Severity of Defoliation

None	No defoliation evident. No cast budworm pupal skins.
Light	Defoliation not discernible from ground or barely discernible from ground. Cast budworm pupal skins present.
Medium	Defoliation readily discernible from ground. Remaining foliage predominantly green.
Heavy	Defoliation readily discernible from ground or complete defoliation. Remaining foliage predominantly brownish.

Between August 7 and 15, 170 observation areas were examined for budworm defoliation throughout the western 6 tiers of townships on the Huron Forest and for six miles along the major transportation routes radiating out from the forest. Nineteen and four-tenths percent of the plots were classified as Heavy, 62.3 percent as Medium, and 13.6 percent as Light; 4.7 percent of the plots did not show evidence of budworm defoliation (Table 1). Comparison with the results of the survey conducted during 1950 confirmed the general observation that a definite shift toward more severe defoliation had occurred. Within the 276,480-acre infestation area included in the Huron Forest (which contains 96,000 acres of jack pine type), 25.0 percent of the plots were classified as Heavy in 1951 as compared to no plots being classified as Heavy in 1950, and 60.6 percent of the plots were classified as Medium as compared to 34.0 percent classified as Medium in 1950. These increases were reflected in decreases in the Light and None categories. Among the 66 observation areas examined adjacent to the forest, the most striking change in severity of defoliation was noted in the Medium category where a change from 52.6 to 65.1 percent occurred.

In addition to budworm defoliation being more severe during 1951, the area of severe defoliation appeared to have expanded eastward approximately 6 miles. Scattered budworm larvae were also collected between the last plot near McKinley, where observable defoliation was detected, and East Tawas on the shore of Lake Huron. Centers of most severe budworm defoliation within and adjacent to the Huron Forest are located in the following areas: (Map 1).

Vicinity of Mack Lake

Along County Highway 489 south of Luzerne

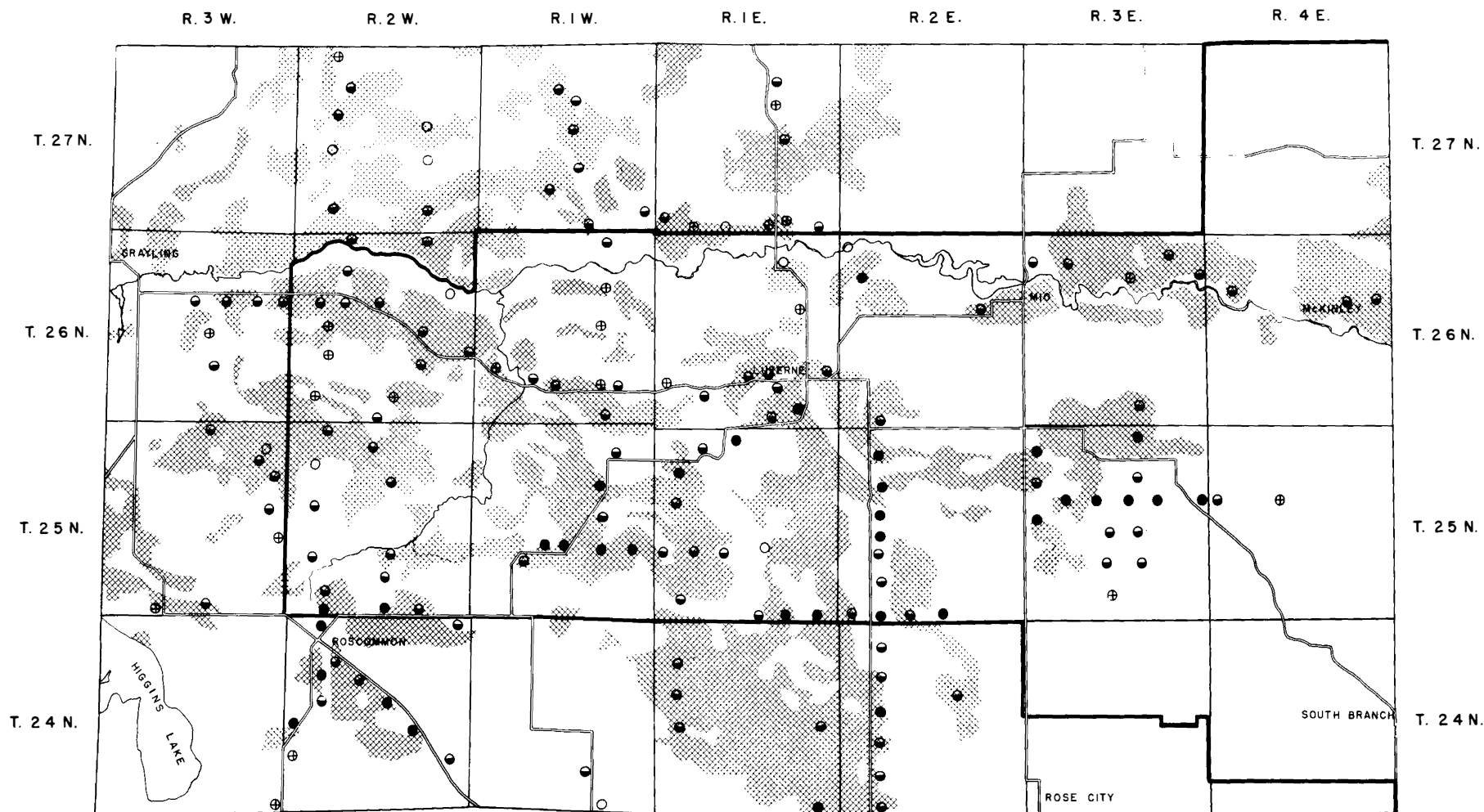
Along State Highway 144 between Luzerne and Roscommon

South and East of Roscommon

During late August and early September 1951, a series of temporary plots were examined on the Huron Forest to determine the losses attributable to budworm defoliation. The results of this survey will be presented in a separate report.

Table 1. Jack-pine Budworm Survey Plots Classified by Intensity of Defoliation - Huron National Forest - 1950 - 1951

Plot Class	1950		1951	
	No. Plots	Percent Plots	No. Plots	Percent Plots
<u>Inside Forest</u>				
Heavy	0	0.0	26	25.0
Medium	33	34.0	63	60.6
Light	50	51.6	10	11.5
None	14	14.4	3	2.9
	97	100.0	104	100.0
<u>Adjacent to Forest</u>				
Heavy	2	10.5	7	10.6
Medium	10	52.6	43	65.1
Light	6	31.6	11	16.7
None	1	5.3	5	7.6
	19	100.0	66	100.0
<u>Total</u>				
Heavy	2	1.7	33	19.4
Medium	43	37.1	106	62.3
Light	56	48.3	23	13.6
None	15	12.9	8	4.7
	116	100.0	170	100.0



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JACK PINE BUDWORM SURVEY

HURON NATIONAL FOREST

1951

LEGEND

No Budworm Defoliation	○
Light Budworm Defoliation	⊕
Medium Budworm Defoliation	◐
Heavy Budworm Defoliation	●
Jack Pine Type	▨

Recommendations

Recommendations made in 1950 for the alleviation of the jack-pine budworm outbreak on the Huron Forest included the encouragement of a salvage cutting operation on the Mio Ranger District in jack pine types where heaviest budworm defoliation had been observed (1). All jack pine which would yield one 8-foot stick of pulp or over to a 4-inch top were cited for cutting, and all suppressed and open-growing "orchard type" jack pine were to be removed whenever it was practical to do so. In addition to improving the general stand condition, a reduction in budworm activity was predicted as a distinct possibility.

Some progress was made toward cutting over the areas most heavily defoliated by the budworm in 1950. Despite the curtailment in woods operations, caused by a critical labor shortage resulting from the increased competition for labor in the Michigan defense agencies and war materials production plants, 3,450 acres of jack pine type within the Huron Forest were cut over to produce 3,492 cords of pulp during 1950 and 1951. An additional 5,210 acres of jack pine type containing 9,875 cords has been sold but not cut.

Recommendations for action during 1952 to assist in the alleviation of the jack-pine budworm outbreak follow the suggestions made last season:

1. Promote salvage cutting activities in areas of most severe budworm defoliation.
2. Remove suppressed and orchard type trees where practical.
3. Investigate possibility of employing parasites of budworm.
4. Continue survey activities to determine areas of most severe defoliation.
5. Initiate ecological studies to determine habits of budworm and likelihood of applying management methods to combat this insect.

Jack-pine Budworm Situation on Kewatha National Forest

The jack-pine budworm was present in outbreak numbers in 1951 on the jack pine plantations on the sandplains of the Rapid River Ranger District reported heavily infested in 1950. A second area where budworm populations appeared on the increase was reported from the Manistique Ranger District. Reconnaissance type surveys made for the purpose of determining the boundaries of these infestations are reported here.

Rapid River Ranger District

In the spring of 1949 a marked increase in the jack-pine budworm population was observed on the Rapid River Ranger District (2). This new center of budworm activity was located in the jack pine plantations on the sand plains of the Stonington Peninsula east of the mouth of the Whitefish

River and the upper reaches of Little Bay de Noc. The infested stands were composed primarily of planted blocks of jack pine and smaller areas of red pine established during the past 15 years. Scattered through this area are a large number of naturally established "orchard type" jack pine.

Intensive surveys made by United States Forest Service personnel in the fall of 1949 revealed a gross infested area of 7,370 acres. Re-examination of the area during early 1950 by the Milwaukee Forest Insect Laboratory confirmed the findings of the previous survey. An area of 320 acres of heavily infested planted jack pine was sprayed experimentally in June 1950 for control of the budworm; the remaining 7,050 acres of lightly infested jack pine were not treated (3). During 1951 4,358 acres of jack pine classified as Medium and Heavy infestation were sprayed within the foregoing area; the half section previously treated in 1950 was also included in the operation. Reconnaissance surveys of the area conducted following the completion of the 1951 control program indicated 918 acres of jack pine heavily infested and in need of treatment. In addition, 128 acres of adjacent jack pine plantations north of Bill's Creek were found lightly infested by the budworm.

Recommendations made in 1950 designed to effect a decrease in the budworm population in the infestation area included the spraying of 3,840 acres of jack pine plantation classified as Heavy and Medium infestation, to be followed by the removal of all "orchard type" jack pine which would make one stick of pulp or more to a 4-inch top through a salvage operation (2). All poor form "orchard type" jack pine too small to make one commercial stick of pulp were cited for felling and lopping and scattering. The spraying operation was carried out as scheduled. The salvage cutting operation was also initiated and by the end of the season, 490 acres of jack pine type within the sprayed area were cut over. An additional 260 acres within the 918 acres of non-sprayed jack pine was also cut over for pulp. Reexamination of these areas in 1952 will be made to determine the influence of the combined insecticidal and silvicultural control operations.

Recommendations for 1952 include the following:

1. Continue salvage cutting operation activities in budworm infested area, removing all "orchard type" jack pine which will yield one or more sticks of pulp.
2. Remove all poor form "orchard type" and suppressed jack pine of non-commercial size.
3. Spray non-treated budworm infested area if budworm population appears high.

Manistique Ranger District

During 1951 an increase in jack-pine budworm activity was reported on the Manistique Ranger District in an infestation of long standing. Light defoliation was observed over a gross area of approximately 2,500 acres in Sections 10, 11, 14 and 15 in Township 40 North, Range 18 West. This area of natural jack pine lies within the general pine type severely infested by the budworm during the outbreak which occurred during the 1930's (5). Although most of the merchantable jack pine was removed from this area during late 1930, subsequent growth has brought much of the jack pine to pole size. Records from the Manistique District indicate that this area now contains 4,500 cords of jack pine of which about 2,000 cords is mature and will be cut during the next 2 years.

Negligible mortality has occurred thus far within this budworm infestation area. However, due to the aggressive habits of the jack-pine budworm and its ability to cause rather widespread damage in jack pine, it is recommended that this infestation be kept under surveillance in 1952 for indications of further build-up in the budworm population. It is also suggested that studies be initiated to determine the habits of the budworm under conditions arising from the previous thinning operation conducted in this area.

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